

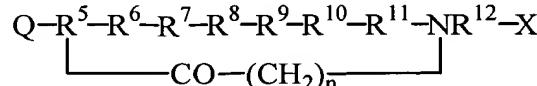
THE CLAIMS

What is claimed is:

5 1. A backbone cyclized somatostatin analog that incorporates at least one building unit, said building unit containing one nitrogen atom of the peptide backbone connected to a bridging group comprising an amide, thioether, thioester, or disulfide, wherein the at least one building unit is connected via the bridging group to form a cyclic structure with a moiety selected from the group consisting of a second building unit, the side chain of an
10 amino acid residue of the sequence or the N-terminal amino acid residue.

2. The backbone cyclized somatostatin analog of claim 1 having the general formula 7:

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Formula No. 7

wherein n is 1 to 5;

X designates a terminal carboxy acid, amide or alcohol group;
20 Q is hydrogen or a mono- or di- saccharide
R⁵ is gamma amino butyric acid, diamino butyric acid, Gly, β-Ala, 5-amino pentanoic acid or amino hexanoic acid;
R⁶ is (D)- or (L)-Phe or Tyr;
R⁷ is (D)- or (L)-Trp, (D)- or (L)-Phe, (D)- or (L)-1Nal, (D)- or (L)-2Nal, or Tyr;
25 R⁸ is (D)- or (L)-Trp;
R⁹ is (D)- or (L)-Lys;
R¹⁰ is Thr, Gly, Abu, Ser, Cys, Val, (D)- or (L)-Ala, or (D)- or (L)-Phe;
R¹¹ is (D)- or (L)-Phe, (D)- or (L)-Ala, Nle, or Cys; and
R¹² is Gly, Val, Leu, (D)- or (L)-Phe, 1Nal, or 2Nal.
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3. The backbone cyclized somatostatin analog of claim 2 wherein:

Q is hydrogen;
R⁵ is GABA;
R⁶ is Phe;
35 R⁷ is Trp;

R⁸ is (D)-Trp;

R⁹ is Lys;

R¹⁰ is Thr;

R¹¹ is Phe;

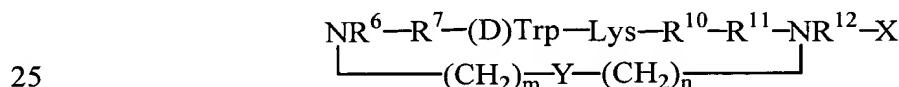
5 R¹² is Gly;

n is 3; and

X is an amide.

4. The backbone cyclized somatostatin analog of claim 2 wherein:
- 10 Q is galactose;
- R⁵ is Dab;
- R⁶ is Phe;
- R⁷ is (L)-Trp;
- R⁸ is (D)-Trp;
- 15 R⁹ is Lys;
- R¹⁰ is Thr;
- R¹¹ is Phe;
- R¹² is Gly;
- n is 3; and
- 20 X is an amide.

5. The backbone cyclized somatostatin analog of claim 1 having the general formula 8:



Formula No. 8

wherein: m and n are 1 to 5

X designates a terminal carboxy acid, amide or alcohol group;

30 R⁶ is (D)- or (L)-Phe, or (D)- or (L)-Ala;

R⁷ is Tyr, (D)- or (L)- Ala, or (D)- or (L)- Phe;

R¹⁰ is Thr, Val, Ser, or Cys;

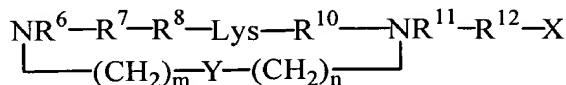
R¹¹ is Val, (D)- or (L)-1Nal, (D)- or (L)-2Nal, or (D) or (L)-Phe;

R¹² is Gly, (D)- or (L)-Ala, or (D) or (L)-Phe; and

35 Y² is amide, thioether, thioester or disulfide.

6. The backbone cyclized somatostatin analog of claim 5 wherein:
R⁶ is (D)- or (L)-Phe;
R⁷ is Tyr or Phe;
R¹⁰ is Thr, Val or Ser;
5 R¹¹ is Val, 1Nal, or 2Nal;
R¹² is Gly; and
Y is amide.

7. The backbone cyclized somatostatin analog of claim 1 having the general formula 9:
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Formula No. 9

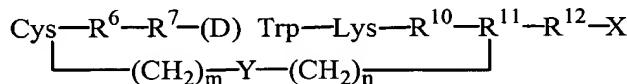
15 wherein: m and n are 1 to 5

X designates a terminal carboxy acid, amide or alcohol group;
R⁶ is (D)- or (L)-Phe, or (D)- or (L)-Ala;
R⁷ is Tyr or (D)- or (L)- Phe;
R⁸ is (D)- or (L)- Trp, (D)- or (L)- 1Nal, or (D)- or (L)- 2Nal;
20 R¹⁰ is Thr, Val, Ser, or Cys;
R¹¹ is Gly or (D) or (L)-Phe;
R¹² is Thr, GABA, (D)- or (L)- 1Nal, (D)- or (L)- 2Nal, or (D) or (L)-Phe; and
Y is amide, thioether, thioester or disulfide.

- 25 8. The backbone cyclized somatostatin analog of claim 7 wherein:
R⁶ is (D)- or (L)- Phe;
R⁷ is Tyr;
R⁸ is (D)Trp, (D)1Nal, or (D)2Nal;
R¹⁰ is Val;
30 R¹¹ is Gly;
R¹² is Thr, 1Nal, or 2Nal; and
Y is amide.

9. The backbone cyclized somatostatin analog of claim 1 having the general formula
13:

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Formula No. 13

wherein m and n are 1 to 5;

X designates a terminal carboxy acid, amide or alcohol group;

10 R⁶ is (D)- or (L)-Phe or Tyr;

R⁷ is (D)- or (L)-Trp, (D)- or (L)-Phe, (D)- or (L)- 1Nal or (D)- or (L)- 2Nal, or Tyr;

R¹⁰ is Thr, Gly, Abu, Ser, Cys, Val, (D)- or (L)-Ala, or (D)- or (L)-Phe;

R¹¹ is (D)- or (L)-Phe or (D)- or (L)-Ala;

15 R¹² is Gly, Val, or (D)- or (L)-Phe; and

Y² is thioether, thioester or disulfide.

10. The backbone cyclized somatostatin analog of claim 9 wherein:

R⁶ is Phe;

20 R⁷ is Trp;

R¹⁰ is Thr;

R¹¹ is Phe;

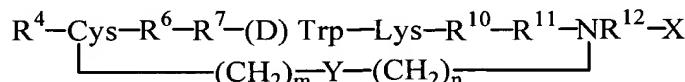
R¹² is Gly; and

Y² is disulfide.

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11. The backbone cyclized somatostatin analog of claim 1 having the general formula
14:

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Formula No. 14

wherein m and n are 1 to 5;

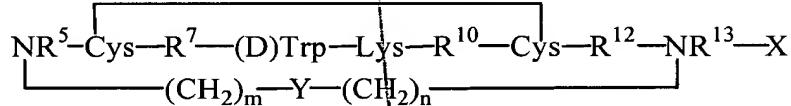
X designates a terminal carboxy acid, amide or alcohol group;

35 R⁴ is (D)- or (L)-Phe or Tyr;

R⁶ is (D)- or (L)-Phe or Tyr;
R⁷ is (D)- or (L)-Trp, (D)- or (L)-Phe, (D)- or (L)-1Nal or (D)- or (L)-2Nal, or Tyr;
R¹⁰ is Thr, Gly, Abu, Ser, Cys, Val, (D)- or (L)-Ala, or (D)- or (L)-Phe;
R¹¹ is (D)- or (L)-Phe or (D)- or (L)-Ala;
5 R¹² is Gly, Val, or (D)- or (L)-Phe; and
Y² is thioether, thioester or disulfide.

12. The backbone cyclized somatostatin analog of claim 11 wherein:
R⁴ is (D)Phe;
10 R⁶ is Phe;
R⁷ is Trp;
R¹⁰ is Thr;
R¹¹ is Phe;
R¹² is Gly; and
15 Y² is disulfide.

13. The backbone cyclized somatostatin analog of claim 1 having the general formula
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Formula No. 15

wherein m and n are 1 to 5;

- 25 X designates a terminal carboxy acid, amide or alcohol group;
R⁵ is (D)- or (L)-Phe or (D)- or (L)-Ala;
R⁷ is (D)- or (L)-Trp, (D)- or (L)-Phe, (D)- or (L)-1Nal or (D)- or (L)-2Nal, or Tyr;
R¹⁰ is Thr, Gly, Abu, Ser, Cys, Val, (D)- or (L)-Ala, or (D)- or (L)-Phe;
R¹² is Gly, Val, or (D)- or (L)-Phe;
30 R¹³ is (D)- or (L)-Phe or (D)- or (L)-Ala; and
Y² is amide, thioether, thioester or disulfide.

- 35 14. The backbone cyclized somatostatin analog of claim 13 wherein:
R⁵ is Phe;
R⁷ is Phe;

R¹⁰ is Thr;
 R¹² is Gly, Val, or (D)- or (L)-Phe;
 R¹³ is Phe; and
 Y² is amide.

15. The backbone cyclized somatostatin analog of claim 1 having the formula:

Phe(N2)-Tyr-(D)2Nal-Lys-Val-Gly(C2)-Thr-X;
Phe(N2)-Tyr-(D)Trp-Lys-Val-Gly(C2)-2Nal-X;
Phe(N2)-Tyr-(D)Trp-Lys-Val-Val-Gly(C2)-X;
Phe(N2)-Tyr-(D)Trp-Lys-Ser-2Nal-Gly(C2)-X;
Phe(N2)-Phe-(D)Trp-Lys-Thr-2Nal-Gly(C2)-X;
GABA-Phe-Trp-(D)Trp-Lys-Thr-Phe-Gly(C3)-X;*
Cys*-Phe-Trp-(D)Trp-Lys-Thr-Phe-Gly(S2)-X;
Phe(C3)-Cys*-Phe-(D)Trp-Lys-Thr-Cys*-Phe-Phe(
(D)Phe-Cys*-Phe-Trp-(D)Trp-Lys-Thr-Phe-Gly(S2)
Galactose-Dab*-Phe-Trp-(D)Trp-Lys-Thr-Phe-Gly(

wherein X designates a terminal carboxy acid, amide, or alcohol group; the asterisk denotes
 20 that the bridging group is connected between the N^a-ω-functionalized derivative of an
 amino acid and the N-terminus of the peptide or the side chain of the Cys residue.

16. A pharmaceutical composition comprising a backbone cyclized somatostatin analog according to claim 1 and a pharmaceutically acceptable carrier.

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17. The composition according to claim 16 wherein the backbone cyclic analog is selective for one somatostatin receptor subtypes.

18. The composition according to claim 16 wherein the backbone cyclic analog is
30 selective for two somatostatin receptor subtypes.

19. A method for treating disorders selected from the group consisting of
atherosclerosis, autoimmune diseases, cancers, diabetic-associated complications, endocrine
disorders, inflammation, gastrointestinal disorders, pancreatitis, post-surgical pain, and
restenosis comprising administering to a mammal in need thereof a pharmaceutical

composition comprising a therapeutically effective amount of a backbone cyclized somatostatin analog according to claim 1.

20. The method according to claim 19 wherein the backbone cyclic analog is selective
5 for one somatostatin receptor subtype.

21. The method according to claim 19 wherein the backbone cyclic analog is selective
for two somatostatin receptor subtypes.

10 22. A method for diagnosing cancer comprising administration of a backbone cyclized somatostatin analog of claim 1.

23. The method according to claim 22 wherein the backbone cyclic analog is used for
imaging the existence of metastases.

15 24. The method according to claim 22 wherein the backbone cyclic analog is labeled
with a detectable probe.

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